



## PATENT ABSTRACTS OF JAPAN

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(21) Application number: **2000062867**(22) Date of filing: **08.03.00**(71) Applicant: **ASAHI KASEI CORP**(72) Inventor: **NISHIHARA HAJIME****(54) COMPOSITE FLAME RETARDANT****(57) Abstract:**

**PROBLEM TO BE SOLVED:** To obtain a composite flame retardant which may impart an excellent flame retardance, flow property, mechanical properties and melt extrusion stability (quality stability), and a composition containing the same.

**SOLUTION:** This composite flame retardant comprises (A) a compound containing a metal

element selected from the groups 1A, 2A, 2B, 3B, 3A, 4A, 4B other than carbon, 5A, 6A, 7A, 8 and 1B of the periodic table and (B) an aromatic group-containing phosphazene compound. Especially, the component (A) is a polyorganosiloxane and/or an inorganic compound, and the component (B) is a phenoxyphosphazene. The above composition contains this flame retardant.

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**Notes:**

1. Untranslatable words are replaced with asterisks (\*\*\*\*).
2. Texts in the figures are not translated and shown as it is.

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**CLAIMS**

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**[Claim(s)]**

[Claim 1] (A) The compound flame retarder which consists of a compound containing the metallic element chosen from 4B, 5A, 6A, 7A and 8 other than the periodic tables 1A and 2A, 2B, 3B, 3A and 4A, and carbon, and 1B group, and a (B) aromatic series radical content FOSUFAZEN compound.

[Claim 2] The compound flame retarder according to claim 1 whose (A) is polyorganosiloxane and/or an inorganic compound.

[Claim 3] The compound flame retarder according to claim 1 or 2 whose (B) is phenoxy FOSUFAZEN.

[Claim 4] The fire-resistant polymer composition which consists of a polymer and one of flame retarders according to claim 1 to 3.

[Claim 5] The fire-resistant resin composition object according to claim 4 which is resin with which the polymer made aromatic polycarbonate or aromatic polycarbonate the subject.

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

[Field of the Invention] This invention relates to a compound flame retarder. Furthermore, it is related with the flame retarder which enabled grant of the fire retardancy which stood high in detail, a mechanical property, and fusion extrusion stability (quality stability).

**[0002]**

[Description of the Prior Art] Polymers, such as a polycarbonate, are lightweight, since it excels in shock resistance, it is used in many fields including autoparts, household appliance components, and OA equipment components, but the application is restricted for the flammability of resin. As the method of flameproofing of a polymer, adding the flame retarder of a halogen system, a phosphorus system, and an inorganic system to resin is known, and, thereby, flameproofing is attained to some extent. However, a close-up of the demand of safety to a fire is taken suddenly in recent years, and ED which does not have

deterioration of an environmental problem or a mechanical property with development of a still more advanced flameproofing technique is desired strongly.

[0003] On the other hand, the flame-retardant-resin constituent containing dimethyl silicone is indicated as an organic silicon compound (JP,63-10184,B, JP,S64-4656,A, United States patent 4497925th, a No. 4387176 Description, JP,H2-133464,A). The silicone indicated by the above-mentioned gazette cannot fully [ fire retardancy and a mechanical property ] bear a practical activity because of volatility, in order that compatibility with resin may carry out phase separation to resin low.

[0004] Moreover, branching or bridge formation methylphenyl silicone The flame-retardant-resin constituent (JP,H10-139964,A, JP,H11-140294,A, JP,H11-217494,A, JP,H11-222559,A, patent No. 2719486, the patent No. 2746519 gazette) to contain is indicated. Since the above-mentioned silicone resin contains the phenyl group, although its compatibility with resin improves, it is not enough and improvement in dispersibility with resin is called for further.

[0005] And the resin composition object which consists of aromatic polycarbonate / a graft copolymer / FOSUFAZEN (EP0728811A2), The flame-retardant-resin constituent (JP,H9-71708,A) which consists of rubber consolidation styrene resin / polyphenylene ether / a FOSUFAZEN derivative is indicated. However, although the resin composition object indicated by the above-mentioned gazette is excellent in fire retardancy, mechanical physical properties, such as impact strength, fall remarkably, and the practical activity is barred.

[0006]

[Problem(s) to be Solved by the Invention] This invention aims at there being no above troubles, namely, offering the flame retarder which can give the fire retardancy which stood high, a mechanical property, and fusion extrusion stability (quality stability) in view of such the actual condition.

[0007]

[Means for Solving the Problem] As a result of this invention persons' examining the flame retarder for flameproofing of a polymer wholeheartedly, the flame retarder which becomes a surprising thing from a specific metal content compound and specific FOSUFAZEN completed a header and this invention for a polymer and especially raising the fire retardancy of a polycarbonate by leaps and bounds.

[0008] That is, this invention offers the compound flame retarder characterized by providing the following, the compound flame retarder (whose A) is especially polyorganosiloxane and/or an inorganic compound and whose (B) is phenoxy FOSUFAZEN, and the constituent containing the \*\*. (A) The compound containing the metallic element chosen from 4B, 5A, 6A, 7A and 8 other than the periodic tables 1A and 2A, 2B, 3B, 3A and 4A, and carbon, and 1B group (B) Aromatic series radical content FOSUFAZEN compound

[0009] This invention is explained in detail hereafter. This invention can relate to the compound flame retarder which consists of a metal content compound of (A) specification,

and (B) aromatic series radical content FOSUFAZEN, and can give the fire retardancy which stood high by blending this flame retarder with the (C) polymer, a mechanical property, and fusion extrusion stability (quality stability). Here, it is important for (A) to have a specific metal atom. By existence with a specific metal content compound and a specific FOSUFAZEN compound, a coat is formed at the time of combustion and fire retardancy improves. And in the case of the metal content compound containing especially an aromatic series radical, fire retardancy improves further.

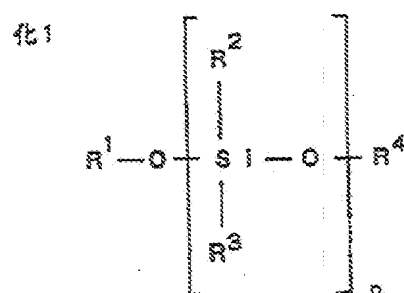
[0010] As for (B), it is indispensable to have an aromatic series radical. Since FOSUFAZEN was inorganic polymer, compatibility with an organic system polymer was missing, but by having an aromatic series radical, especially, the compatibility with an aromatic series system polymer increased, and a header and this invention were completed for mechanical strengths, such as impact strength, improving. (A) In this invention The periodic tables 1A and 2A, 2B, 3B, 3A, It is a compound containing the metallic element chosen from 4B, 5A, 6A, 7A and 8 other than 4A and carbon, and 1B group, and inorganic compounds, such as polyorganosiloxane and a hydrated metallic compound, or an organic-metal-salt system compound is desirable also in especially inside.

[0011] The above-mentioned polyorganosiloxane is polyorganosiloxane represented with silicone or organic silicate. Silicone is classified into oil, resin, and rubber from description. Oil is straight chain-like silicone and resin is monofunctional  $R_3SiO_{0.5}$ . M unit expressed,  $RSiO_{1.5}$  of D unit expressed with  $R_2SiO$  of two organic functions, and three organic functions T unit expressed,  $SiO_2$  of four organic functions  $R(RO)SiO_{2.0}$  (X unit) in which the Q unit expressed and alkoxy \*\*\*\* contained aryloxy, (RO) It is silicone resin which has the straight chain-like silicone or three-dimensions network structure containing branching structure made combining the structural unit of  $2SiO_{3.0}$  (Y unit), and rubber is the vulcanization object of the silicone of the shape of an amount of polymers type gum-like straight chain etc. As other silicone, there are denaturation silicone which denaturalized by epoxy, amino \*\* mercapto, an methacrylic radical, etc. or a (Polycarbonate PC)-silicone copolymer, acrylic rubber silicone complex, etc.

[0012] In this invention, [ the silicone of the one shape of a desirable straight chain of polyorganosiloxane ] The unit shown by next \*\* 1 is contained, it is desirable that the kinematic viscosity at 25 degrees C of JIS-K2410 convention is ten or more centistokes, and it is 1000 or more centistokes still more preferably 100 or more centistokes more preferably especially.

[0013]

[Formula 1]



[0014] here -- R1 - R4 it is the hydrocarbon of the carbon numbers 1-20 containing an aromatic series radical and an alkyl group, and even if the same, you may differ -- desirable -- a phenyl group -- 10-90mol % -- containing -- further -- desirable -- 40-90mol % -- most -- desirable -- 50-90mol % -- it contains. Moreover, R1 R4 You may carry out ring formation. And n is expressed with a number average, is one or more, and is 100 or more still more preferably ten or more preferably.

[0015] In this invention, another desirable polyorganosiloxane is silicone resin (bridge formation silicone resin) which has the straight chain-like silicone (branching silicone) or three-dimensions network structure containing branching structure. Such silicone consists of RSiO1.5 and/or (T unit) RSiO1.0 (D unit). You may contain R3 SiO0.5 (M unit), SiO2.0 (Q unit), R(RO) SiO2.0 (X unit), and (RO) 2 SiO3.0 (Y unit) if needed.

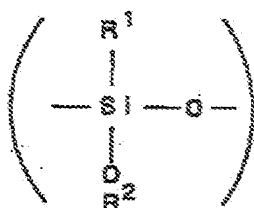
[0016] Here, it is the hydrocarbon of carbon numbers 1-20, a methyl group, an ethyl group, butyl, a phenyl group, and benzyl of R are desirable, and its thing containing especially a methyl group and a phenyl group is desirable. When a phenyl group contains 10weight % or more, a water resisting property, thermal stability, and compatibility with aromatic series system resin improve. [ the branching silicone or bridge formation silicone resin in this invention ] 100-1 million are desirable still more desirable, and the weight average molecular weight of polystyrene conversion of the GPC method is 1000-10000, for example, it is manufactured by hydrolysis of silane compounds, such as an ORUGANO halo silane, and the manufacturing method is indicated by JP,H10-139964,A etc.

[0017] In this invention, further [ another desirable polyorganosiloxane ] - It is organic silicate containing the substituent shown by OR (R is the hydrocarbon of carbon numbers 1-20). for example, organic silicate, such as orthochromatic silicate ester and its hydrolysis condensate or an ORGANO alkoxy polysiloxane, and an ORGANO aryloxy polysiloxane, -- or -- for example, In the polysiloxane which has Si-R' (R and R' is a hydrocarbon group) by using side-chain Si-O-R as an essential ingredient to a principal chain (Si-O) if needed The ORGANO alkoxy polysiloxane unit containing organic silicate containing branching or the structure of cross linkage expressed with Si-O-Si etc. or at least one or more sorts of units which are shown by next \*\* 2-4, or an ORGANO aryloxy polysiloxane unit is included.

[0018]

[Formula 2]

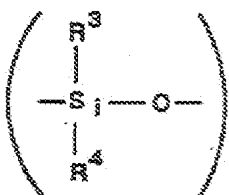
化2



[0019]

[Formula 3]

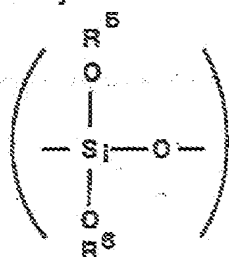
化3



[0020]

[Formula 4]

化4



[0021] (However, R1 - R6 are the hydrocarbons of carbon numbers 1-20.) Here, it is R1 - R6. It is the hydrocarbon of carbon numbers 1-20, and a methyl group, an ethyl group, butyl, a phenyl group, and benzyl are desirable, and the thing containing especially a methyl group and a phenyl group is desirable. When a phenyl group contains 10weight % or more, a water resisting property, thermal stability, and compatibility with aromatic series system resin improve.

[0022] In this invention, as an inorganic compound as the above (A), an aluminum hydroxide, A magnesium hydroxide, a dolomite, a hydrotalcite, a calcium hydroxide, The hydrate of inorganic metal compounds, such as a hydrate of a barium hydroxide, basic magnesium carbonate, zirconium hydroxide, and the tin oxide, An aluminum oxide, an iron oxide, titanium oxide, manganese oxide, a magnesium oxide, Zirconium oxide, a zinc oxide, molybdenum oxide, cobalt oxide, a bismuth oxide, Metallic oxides, such as chrome oxide, tin oxide, antimony oxide, nickel oxide, copper oxide, and tungstic oxide, Aluminum, iron, titanium, manganese, zinc, molybdenum, cobalt, Metal powders, such as a bismuth, chromium, nickel, copper, a tungsten, tin, and antimony, and zinc borate, metaboric acid zinc, metaboric acid barium, zinc carbonate, a magnesium carbonate, a calcium carbonate, a barium carbonate, a silicon oxide, etc. are mentioned. At least one sort of these may use two or more sorts together. Especially in this, fire-resistant effectiveness is good and what

was chosen from the group which consists of a magnesium hydroxide, an aluminum hydroxide, basic magnesium carbonate, and a hydrotalcite is economically advantageous. [0023] In this invention, as an organic-metal-salt system compound as the above (A) For example, a trichlorobenzene sulfonic acid potassium, a perfluoro butane sulfonic acid potassium, Organic sulfonic acid metal salts, such as a diphenyl sulfone 3-sulfonic acid potassium, [ the ring of aromatic series radical content polymers, such as an aromatic series sulfone imide metal salt or a styrene system polymer, and polyphenylene ether, ] They are organic-metal-salt system compounds, such as polystyrene sulfonic acid alkaline metal salt which the sulfonic acid metal salt, the sulfuric-acid metal salt, the phosphoric-acid metal salt, and the boric-acid metal salt combined. As a polymer, in the case of a polycarbonate, such an organic-metal-salt system compound especially promotes decarboxylation at the time of combustion, and raises fire retardancy to it. Furthermore, in polystyrene sulfonic acid alkaline metal salt, oneself, a sulfonic acid metal salt serves as a point constructing a bridge at the time of combustion, and contributes to carbonization coat formation greatly.

[0024] If (B) in this invention is a compound which has an aromatic series radical and which has the structure where the phosphorus atom and the nitrogen atom were tied with the double bond, there will be no limit in particular, for example, annular FOSUFAZEN or straight chain-like FOSUFAZEN will be mentioned. Also in FOSUFAZEN, what contains aromatic series radicals, such as a phenyl group, a cresyl radical, a xylyl group, and a bis-phenyl group, as a substituent from a viewpoint of compatibility with aromatic polycarbonate is desirable. Specifically Phenoxy propoxy FOSUFAZEN, phenoxy methoxy FOSUFUAZEN, It is JIFENOKISHIFOSUFAZEN, phenoxy amino FOSUFAZEN, phenoxy fluoro alkyl FOSUFAZEN, etc., and these FOSUFAZEN compounds are manufactured by permuting chlorophosphazene by alcohols or phenols.

[0025] 1 to 99 weight % of (A) is desirable, and good better \*\* of (A) in the compound flame retarder of this invention and the quantitative ratio of (B) is 30 to 70 weight % most preferably ten to 90weight % further. Although the polymer used as (C) in this invention is a rubber-like polymer, thermoplastics, or thermosetting resin, its thermoplastics is especially desirable also in it. As for one rubber-like polymer of the above-mentioned polymer, it is desirable that glass transition temperature (Tg) is less than -30 degree C, and when -30 degrees C is exceeded, it is in the inclination for shock resistance to fall.

[0026] As an example of such a rubber-like polymer, polybutadiene, Pori (styrene butadiene), The saturation rubber which hydrogenated diene system rubber and the above-mentioned diene rubber, such as Pori (acrylonitrile butadiene), Acrylic rubber and ethylene PUROIPIRE copolymer rubbers, such as polyisoprene rubber, chloroprene rubber, and polyacrylic acid butyl, The thermoplastic elastomer containing cross linked rubbers, such as ethylene \*\*\*\*\*- diene monomer ternary polymerization object rubber (EPDM) and ethylene octene copolymer rubber, or non-cross linked rubber, and the above-mentioned rubber component etc. can be mentioned.



[0027] Also in the above-mentioned thermoplastic elastomer, especially a styrene thermoplastic elastomer is desirable. It is the block copolymer which consists of an aromatic vinyl unit and a conjugated diene unit, or the block copolymer with which hydrogenation of the above-mentioned conjugated diene unit part was carried out selectively, and a thermal stability viewpoint to a hydrogenation styrene thermoplastic elastomer is especially still more desirable. [ the most desirable thermoplastics in the (C) polymer in this invention ] For example, independent or things which mixed two or more sorts, such as a polystyrene system, a polyphenylene ether system, a polyolefine system, a polyvinyl chloride system, a polyamide system, a polyester system, a polyphenylene sulfide system, a polycarbonate system, and a polymethacrylate system, can be used. The thermoplastics of a polyphenylene ether system, a polystyrene system, and a polycarbonate system is desirable especially as a thermoplastic polymer.

[0028] One aromatic polycarbonate of the above-mentioned thermoplastics can be chosen from an aromatic series gay polycarbonate and aromatic series copoly carbonate. As the manufacture method, the phosgene method which blows a phosgene into 2 organic-functions phenol system compound under existence of a caustic alkali and a solvent, or the ester interchange method for carrying out the ester interchange of for example, a 2 organic-functions phenol system compound and the diethyl carbonate under existence of a catalyst can be mentioned. The range of 10,000-100,000 is suitable for this aromatic polycarbonate for viscosity average molecular weight. The above-mentioned 2 organic-functions phenol system compound here A 2 and 2'-bis(4-hydroxyphenyl) propane, A 2 and 2'-bis(4-hydroxy 3, 5-dimethylphenyl) propane, Bis(4-hydroxyphenyl) methane, 1, and 1'-bis(4-hydroxyphenyl) ethane, - bis(4-hydroxyphenyl) butane, and 2 and 2 '2, 2'-bis(4-hydroxy 3, 5-diphenyl) butane, A 2 and 2'-bis(4-hydroxy 3, 5-dipropyl phenyl) propane, It is 1, a 1'-bis(4-hydroxyphenyl) cyclohexane, the 1-phenyl 1, 1'-bis(4-hydroxyphenyl) ethane, etc., and especially 2 and 2'-bis(4-hydroxyphenyl) propane [bisphenol A] are desirable. In this invention, 2 organic-functions phenol system compound may be used independently, or may use them together.

[0029] [ one styrene resin of the thermoplastics under above (C) ] It is rubber denaturation styrene resin, and/or rubber non-denaturalizing styrene resin, it is desirable to consist of a rubber denaturation styrene resin independent or rubber denaturation styrene resin, and rubber non-denaturalizing styrene resin especially, and if it is the flame retarder of this invention, compatibility, or the thing that can carry out uniform dispersion, there will be no limit in particular. Moreover, a rubber denaturation styrene system polymer says the polymer which a rubber-like polymer distributes in the shape of a particle in the matrix which consists of a vinyl aromatic series system polymer. This and a copolymerizable vinyl monomer are added an aromatic vinyl monomer and if needed under existence of a rubber-like polymer, and monomer mixture is obtained with polymerization methods, such as a well-known bulk polymerization, an emulsion polymerization, and a suspension polymerization.

[0030] [ another polyphenylene ether of the thermoplastics under above (C) ] It has a ring in a principal chain and they are the polymers combined by ether linkage. It is specifically the copolymer of Pori (2, 6-dimethyl 1, 4-phenylene ether), 2, and 6-dimethylphenol and a 2, 3, and 6-trimethyl phenol etc., and Pori (2, the 6-dimethyl 1, 4-phenylene ether) is especially desirable. In this invention, the most desirable polymer as (C) blends aromatic series HORIKABONETO with a subject for styrene resin or a styrene thermoplastic elastomer, polyphenylene ether, etc., and is resin.

[0031] the loadings of the compound flame retarder of this invention receive (C) 100 weight section -- 0.01 - the 100 weight sections -- desirable -- further -- desirable -- 0.1 - 50 weight sections -- it is 1 - 20 weight section most preferably. When adding the compound flame retarder of this invention to (C), flame retarders other than (A) and (B) can be blended as a (D) fire retardancy assistant if needed. For example, more than a kind chosen from a halogen system, a phosphorus system, a nitrogen system, and a char formation agent can be blended.

[0032] The halogen series flame retardant as the above (D) A halogenation bisphenol, An aromatic series halogenated compound, a halogenation polycarbonate, a halogenated-aromatics vinyl system polymer, Halogenation SHIANU rate resin, halogenation polyphenylene ether, etc. are mentioned. Preferably Deca bromo diphenyloxide, tetra-bromine bisphenol A, The oligomer of tetra-bromine bisphenol A, bromine-ized bisphenol system phenoxy resin, A bromine-ized bisphenol system polycarbonate, bromine-ized polystyrene, They are bromine-ized bridge formation polystyrene, bromine-ized polyphenylene oxide, PORIJI bromine phenylene oxide, decabromodiphenyloxide bisphenol condensate, halogen-containing phosphoric ester, fluororesin, etc. As a phosphorus series flame retardant in the above (D), an organic phosphorous compound, red phosphorus, inorganic system phosphate, etc. are mentioned.

[0033] As an example of the above-mentioned organic phosphorous compound, they are a phosphine, phosphine oxide, a BIHOSU fin, phosphonium salt, phosphinate, phosphoric ester, phosphite, etc. More specifically Triphenyl phosphate, a methyl neo BENCHIRUFOSU fight, HENTA erythritol diethyldiphosphite, methyl neopentyl FOSUFONETO, Phenyl neopentyl phosphate, pentaerythritol diphenyl JIFOSU Fet, They are JISHIKURO pentyl HAIPOJI phosphate, dineopentyl hypophosphite, a phenyl pyrocatechol FOSU fight, ethyl pyrocatechol phosphate, and JIPIRO catechol HAIPOJI phosphate. Here, an aromatic series system phosphoric ester monomer and an aromatic series system phosphoric ester condensation product are desirable especially as an organic phosphorous compound.

[0034] In the above (D), [ one red phosphorus of a phosphorus series flame retardant ] Beforehand the surface other than general red phosphorus An aluminum hydroxide, That by which coating treatment was carried out with the coat of the \*\*\*\*\* metal hydroxide from a magnesium hydroxide, zinc hydroxide, and hydroxylation titanium, That by which coating treatment was carried out with the coat which consists of the metal hydroxide and

thermosetting resin which are chosen from an aluminum hydroxide, a magnesium hydroxide, zinc hydroxide, and hydroxylation titanium, Coating treatment was carried out to the duplex with the coat of thermosetting resin on the coat of the metal hydroxide chosen from an aluminum hydroxide, a magnesium hydroxide, zinc hydroxide, and hydroxylation titanium.

[0035] In the above (D), one inorganic system phosphate of a phosphorus series flame retardant has typical ammonium polyphosphate. The nitrogen flame retardant as the above (D) has a triazine system, FOSUFAZEN, diazo \*\*, a triazole system, a typical tetrazole system compound, etc. As an example of the above-mentioned triazine compound, a melamine, MERAMU, MEREMU, A melon (product according to deammonia of MEREMU 3 to three molecules in more than 600-degreeC), melamine \*\*\*\*\*-\*\*, a phosphoric-acid melamine, SAKUSHINO guanamine, AJIPO guanamine, methyl guru taro guanamine, melamine resin, BT resin although it can mention Melamine \*\*\*\*\*-\*\* is desirable especially from a low volatility viewpoint.

[0036] [ the tetrazole system compound as a nitrogen flame retardant ] 5-phenyl tetrazole, 5, and 5'-screw tetrazole 2 ammonium salt, They are a 5 and 5' - screw tetrazole 2 aminoguanidine salt, 5, and 5'-screw tetrazole piperazine salt, azobis tetrazole 2 guanidine salt, azobis tetrazole 2 aminoguanidine salt, etc. The fibrous flame retarder as the above (D) is a flame retarder used for dropping prevention of charcoal, and becomes fibrous at the time of addition or processing. An aramid fiber, polyacrylonitrile fiber, fluororesin, etc. are raised as the example.

[0037] As for the above-mentioned aramid fiber, it is desirable that an average diameter is [ mean fiber length ] 0.1-10mm in 1-500 micrometers. Isophthalamide or poly para-phenylene terephthalamide can be dissolved in an amide system polar solvent or a sulfuric acid, and it can manufacture by carrying out solution spinning with a wet type or dry process. [ polyacrylonitrile fiber as said fibrous flame retarder ] It is manufactured by the wet spinning method which an average diameter dissolves a polymer in solvents, such as dry spinning which it is desirable that mean fiber length is 0.1-10mm in 1-500 micrometers, it dissolves a polymer in solvents, such as dimethylformamide, and spins dryly in the airstream of 400-degreeC, or a nitric acid, and carries out wet spinning underwater.

[0038] Fluororesin as said fibrous flame retarder is resin which contains a fluorine atom in resin. As the example, Pori mono-fluoro ethylene, Pori difluoro ethylene, Pori trifluoro ethylene, polytetrafluoroethylene, tetrafluoroethylene / hexafluoropropylene copolymer can be mentioned. Moreover, you may use together the above-mentioned fluorine-containing monomer and a copolymerizable monomer if needed. Novolak resin as a char formation agent as the above (D) is phenol novolak resin obtained by condensing a phenol and aldehydes under existence of an acid catalyst like a sulfuric acid or a hydrochloric acid.

[0039] the addition of the above (D) in this invention receives the (C) polymer 100 weight section -- 0.001 - the 100 weight sections -- desirable -- further -- desirable -- 1 - 50 weight section -- most -- desirable -- 3 - 20 weight section -- it is 5 - 15 weight section very

preferably. [ a polymer composition ] although the polymer composition containing the compound flame retarder of this invention is obtained by carrying out fusion kneading of each above-mentioned component, for example with a commercial single screw extruder, a commercial twin screw extruder, etc. If wished, coloring agents, such as reinforcing agents, such as thermostabilizers other than the above, lubricant, a bulking agent, and a glass fiber, a color, and a pigment, etc. can also be added to a constituent. Thus, the obtained constituent is excellent in the balance property of fire retardancy, a mechanical property, and fusion extrusion stability (quality stability).

[0040]

[Example] Hereafter, although a work example explains this invention to a detail further, thereby, this invention does not receive a limit at all. In addition, measurement in a work example and a comparative example was performed using the following methods or measurement machines.

(1) VB (Vertical Burning) law based on fire-resistant UL-94 estimated self-extinguishing. (1/16-inch thickness test piece)

(2) It measured by the method based on TM-D256 [ given in Izod-impactive-strength AS ]. (23 degrees C, a 1/8 inch thickness test piece with a V notch: Unit J/m)

(3) Extrusion stability (stability of quality)

The Izod impactive strength of the constituent which performed continuation melt extruding for 10 hours, and was obtained for every hour in the resin composition object was measured using the fusion extruder, and mass-production nature (stability of quality) was evaluated from the rate of change (%) over the mean intensity.

[0041] Each component used by the work example and a comparative example used the following.

(\*\*) metal content compound (1) polyorganosiloxane -- well-known technique, for example, chapter 17 of "a silicone handbook [Nikkan Kogyo Shimbun Ito [ Kunio ] edit (1990)]", Kinematic viscosity (25 degrees C) of JIS-K2410 different convention according to a silicone manufacturing method The silicone of different structure and the phenyl group permutation from which mol % differed which it has was obtained.

(2) Magnesium hydroxide (MOH)

The product made from Consonance Chemical industry, trade name Kuisma (MOH is called)

[0042] (3) Organic sulfonic acid metal salt (KSS)

Made in UCB Japan, diphenyl sulfone 3-sulfonic acid potassium (KSS is called)

(4) Organic sulfonic acid metal salt (FS)

The Dainippon Ink & Chemicals, Inc. make, perfluoro butane sulfonic acid potassium (FS is called)

(\*\*) FOSUFAZEN compound (FZ is called)

Various FOSUFAZEN was manufactured according to the well-known manufacturing method (JP,H11-181429,A description).

[0043] (Ha) Product made from polymer (1) Aromatic-polycarbonate Sumitomo Dow  
[Bisphenol A mold trade name caliber 13 (PC is called)]

(2) Rubber denaturation polystyrene (HIPS)

Asahi Chemical Industry Co., Ltd. make [polybutadiene / polystyrene (10/90: bulk density)  
trade name Styron (HIPS is called)]

(3) ABS plastics (ABS)

Asahi Chemical Industry Co., Ltd. make [acrylonitrile / polybutadiene / styrene (20[ 24///] 56:  
bulk density) trade name SUTAI rack ABS (ABS is called)]

[0044] (4) Styrene ethylene butylene styrene copolymer (SEBS) Asahi Chemical Industry  
Co., Ltd. make [trade name tough tech (SEBS is called)]

(5) Maleic-anhydride denaturation styrene ethylene butylene styrene copolymer (m-SEBS)  
Asahi Chemical Industry Co., Ltd. make [trade name tough tech (m-SEBS is called)]

(6) Styrene butadiene copolymer (SB)

Asahi Chemical Industry Co., Ltd. make [trade name tough PUREN (SB is called)]

(7) Epoxy denaturation styrene butadiene copolymer (ESB)

Daicel Chemical Industries, Ltd. make [trade name EPO friend (ESB is called)]

[0045] (8) Polyphenylene ether (PPE)

Asahi Chemical Industry Co., Ltd. make [trade name xyron (PPE is called)]

(9) Polypropylene (PP)

Japan Polychem make (PP is called)

(10) Ethylene octene copolymer (EO)

The product made from a DEYUPON Dow elastomer [trade name engagement (EO is  
called)]

(11) EO-PP bridge formation object (TPV)

The thermoplastic polypropylene over which organic peroxide and a divinylbenzene were  
used for EO/PP=50 / 50 (bulk density), and the bridge was dynamically constructed with the  
twin screw extruder was used. (TPV is called)

[0046] (12) Polybutylene terephthalate (PBT)

Toray Industries, Inc. make (PBT is called)

(13) Epoxy resin (EP)

Product made from Asahi Tiba Non-[ thermoplastic ] halogen resin grade (EP is called)

(14) Polyamide 6 (PA6)

Toray Industries, Inc. make (PA6 are called)

(\*\*) Fire-resistant assistant (1) polytetrafluoroethylene (PTFE)

Daikin Industries, LTD. make (PTFE is called),

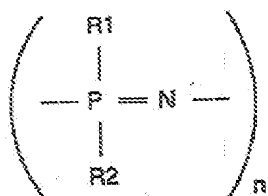
[0047] The constituent of the one to table 4 (the amount of (A), (B), and (D) is the weight  
section.) description was mixed with one to work-examples 1-38 and comparative example  
6 Henschel mixer, and continuation fusion extrusion was succeedingly performed by 250-  
degree C temperature conditions for 10 hours using the twin screw extruder (40mmphi,  
ratio-of-length-to-diameter=47). The two-article screw was used as a screw. Here, the

FOSUFAZEN compound which contains the unit expressed with the \*\* 5 following formula as a (B) component was used. However, R1 and R2 are the substituents in a table, and n expresses a number average degree of polymerization.

[0048]

[Formula 5]

化5



[0049] Thus, the cylinder preset temperature of 250 degrees C was produced on condition of the following from the obtained constituent, and it evaluated by producing a Plastic solid by injection molding with the die temperature of 60 degrees C. The result was described in tables 1-4. According to the tables 1-4, by using the compound flame retarder set to (A) from (B) shows that fire retardancy and not only a mechanical property but fusion extrusion stability (quality stability) is excellent. Moreover, branching or bridge formation silicone resin which has D unit / T unit also in (A) shows that the silicone oil of D unit and the straight chain silicone which especially contains an aromatic series radical give the fire retardancy, the mechanical strength, and extrusion stability (quality stability) which stood high.

[0050]

[Table 1]

表 1

	実施例		比較例				実施例					
	1	2	1	2	3	4	3	4	5	6	7	8
(A) 成分割合 (%)	2											
D単位/T単位 (g/g)	100/0											
7E26/7E27 (g/g)	25/75											
動粘度 (センチポイズ)	500											
(B) FZ値	3			0	3	3						
R1	7E27	7E28	7E29	11秒	—	7E30	フェノキシ					
R2	7E31	7E32	7E33	11秒	—	7E34	フェノキシ					
n	3			—	3	3						
構造	直鎖		環状		—	環状	環状					
(C) PC 100重量部	100											
燃焼性	○	○	x	x	○	○	○	○	○	○	○	○
アイゾット衝撃強度 (J/m)	100	120	30	15	120	30	100	130	120	100	80	100
押出安定性:7E35の変化率 (%)	7	5	50	78	31	48	6	3	2	8	9	8

燃焼性: ○ 20秒未満内に自己消火  
 ○ 20~40秒以内に自己消火  
 △ 40秒を超えて自己消火  
 x 全焼

[0051]

[Table 2]

表 2

組成物	実施例									
	9	10	11	12	13	14	15	16	17	18
(A-1) ポリブチレン	3									
D単位/T単位 (モル比)	100/0									
アセチル/メチル (モル比)	88/12									
融結度 (モル%)	49.0									
(A-2) KSS値	0.6									
(B) FZ値	2									
R1	フェノキシ									
R2	フェノキシ									
n	3									
構造	環状									
(C) PC100重量部	PC/ B-SBS 98/2	PC/ TPV 98/2	PC/ ABS 98/2	PC/ HIPS 98/2	PC/ SBS 98/2	PC/ SB 98/2	PC/ PP 98/2	PC/ PB 98/2	PPE	100
(D) PTFE値	0.5									
燃焼性	○	○	○	○	○	○	○	○	○	○
アイソット衝撃強度 (J/m)	150	140	130	120	150	130	120	100	160	100
押出安定性: 70°C の変化率 (%)	4	5	5	8	4	7	5	4	5	8

燃焼性: ○ 20秒未満内に自己消火  
 ○ 20-40秒以内に自己消火  
 △ 40秒を超えて自己消火  
 × 全焼

[0052]

[Table 3]



表 3

実施例													
3													
100/0													
25/75													
510													
2													
7エノキシ													
7エノキシ													
3													
性状													
(C) PC100重層部													
燃焼性													
アイソット衝撃強度 (J/m)													
押出安定性:70' 71の硬化率 (%)													
燃焼性													
HIPS													
ABS													
SEBS													
SB													
EP													
PPE													
PPE/HIPS 50/50													
PP													
PBT													
PAG													

燃焼性: ◎ 20秒未満内に自己消火  
○ 20~40秒以内に自己消火  
△ 40秒を超えて自己消火  
× 全焼

[0053]

[Table 4]

表 4

組成物	実施例				比較例			実施例						
	29	30	31	32	5	6	33	34	35	36	37	38		
	3													
(A-1) 成分Aの含有率 (%)	0	3	0	3	0									
D単位/T単位 (g/g)	—	100/0	—	100/0	—					100/0				
フェノール (g/g)	—	95/5	—	25/75	—					25/75				
動粘度 (センチポイズ)	—	490	—	480	—					500				
(A-2) MOH値	30	30	30	30	30					0	PS 0.6			
(B) FZ値		2				0				1				
R1		フェノキシ				—				フェノキシ		フェノキシ		
R2		フェノキシ				—				フェノキシ	メトキシ	メトキシ		
n		3				—				3	10	3		
構造		環状				—				環状				
(C) PC100重量部		PP	TPV		PP	TPV	PC							
燃焼性	○	○	○	○	×	×	○	○	○	○	○	○		
アイソット衝撃強度 (J/m)	80	100	180	200	30	55	110	120	95	100	105	90		
揮発安定性:70℃の炭化率 (%)	8	5	7	4	38	49	6	4	8	6	7	9		

燃焼性: ○ 20秒未満内に自己消火  
○ 20~40秒以内に自己消火

[0054]

[Effect of the Invention] This invention relates to the compound flame retarder which enabled grant of the fire retardancy which stood high, a fluidity, a mechanical property, and fusion extrusion stability (quality stability). The fire retarding material obtained using the compound flame retarder of this invention, The role played in these industrial worlds is

large.

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[Translation done.]

